

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
TH ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100243

Project: Dimock Residential GW Site, Dimock, PA
Analysis method: Actinides (Thorium) by Extraction Chromatography
Report ID: 1100243-TH
Report type: Original
Date reported: 03/22/2012
Total pages in report: 33

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01194D	FB01	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01195E	HW19	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01196F	HW19-P	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01197G	FB05	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01198H	HW24-P	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01199J	FB03	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01200H	HW01	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01201J	HW02	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01202K	HW02Z	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01203L	HW08A	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01204M	HW04	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012
B2.01205N	HW05	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01206P	HW12	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01207Q	HW14	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01208R	HW14-P	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01209T	FB04	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01210K	EB01	PA:DIMOCK	WATER-DRINKING	01/28/2012	01/31/2012
B2.01211L	HW17	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01212M	HW24	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01213N	FB02	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012

EXCEPTIONS


- Packaging and shipping**—No problems were observed.
- Documentation**—No problems were observed.
- Sample preparation**—No problems were encountered.
- Analysis**— The samples in this SDG were reanalyzed as a result of yields that were above the upper acceptance limit for most of the samples in the SDG. Samples B2.01197 and B2.01202 still had yield failures once reanalyzed. Due to time constraints, the results of the reanalyses are being reported. Upon client request these two samples will be reanalyzed. In addition, samples B2.01197 and B2.01197 DUP were loaded into the detectors incorrectly. The information was corrected to reflect the correct detector ID and its associated data with the correct sample.
- Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Yields**—All chemical yields were within acceptance limits except the yields for samples B2.01197 and B2.01202.
3. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

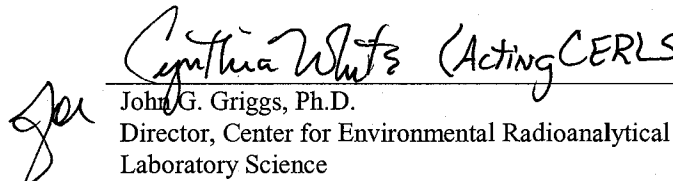
I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.



Mary F. Wisdom
Quality Assurance Manager, NAREL

3-27-12

Date



John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

3-22-12

Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

ANALYSIS SUMMARY

Analysis Procedure: NAREL TH-EICHROM
Title: Actinides (Thorium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01194D	DUP	N/A	03/15/2012	0015806K	0008533B
B2.01195E		N/A	03/15/2012	0015797C	0008533B
B2.01196F		N/A	03/15/2012	0015797C	0008533B
B2.01197G		N/A	03/15/2012	0015797C	0008533B
B2.01197G		N/A	03/15/2012	0015797C	0008533B
B2.01198H		N/A	03/15/2012	0015797C	0008533B
B2.01199J		N/A	03/15/2012	0015797C	0008533B
B2.01200H		N/A	03/15/2012	0015797C	0008533B
B2.01201J		N/A	03/15/2012	0015797C	0008533B
B2.01202K		N/A	03/15/2012	0015797C	0008533B
B2.01203L		N/A	03/15/2012	0015797C	0008533B
B2.01204M		N/A	03/15/2012	0015797C	0008533B
B2.01205N		N/A	03/15/2012	0015806K	0008533B
B2.01206P		N/A	03/15/2012	0015806K	0008533B
B2.01207Q		N/A	03/15/2012	0015806K	0008533B
B2.01208R		N/A	03/15/2012	0015806K	0008533B
B2.01209T		N/A	03/15/2012	0015806K	0008533B
B2.01210K		N/A	03/15/2012	0015806K	0008533B
B2.01211L		N/A	03/15/2012	0015806K	0008533B
B2.01212M		N/A	03/15/2012	0015806K	0008533B
B2.01213N		N/A	03/15/2012	0015806K	0008533B
LCS-00632962J *	LCS	N/A	03/15/2012	0015806K	0008533B
RBK-00632961H *	RBK	N/A	03/15/2012	0015806K	0008533B

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01194D	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS97	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.75e-03	5.1e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th228	3.77e-02	6.5e-02	1.1e-01	PCI/L	03/13/2012 10:50 CDT
Th230	2.51e-02	4.4e-02	5.4e-02	PCI/L	03/13/2012 10:50 CDT
Th232	8.36e-03	3.7e-02	7.2e-02	PCI/L	03/13/2012 10:50 CDT

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01195E	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS81	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	3.57e-02	7.7e-02	1.2e-01	PCI/L	03/12/2012 11:15 CDT
Th228	4.47e-02	6.2e-02	9.8e-02	PCI/L	03/12/2012 11:15 CDT
Th230	2.61e-02	4.7e-02	7.3e-02	PCI/L	03/12/2012 11:15 CDT
Th232	3.72e-03	3.4e-02	7.3e-02	PCI/L	03/12/2012 11:15 CDT

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01196F	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS83	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-1.47e-02	5.1e-02	1.4e-01	PCI/L	03/12/2012 11:15 CDT
Th228	1.30e-01	8.8e-02	9.5e-02	PCI/L	03/12/2012 11:15 CDT
Th230	1.34e-01	8.4e-02	6.6e-02	PCI/L	03/12/2012 11:15 CDT
Th232	-7.66e-03	2.7e-02	7.5e-02	PCI/L	03/12/2012 11:15 CDT

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01197G	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS84	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227 *	0.00e+00	4.5e-02	9.3e-02	PCI/L	03/12/2012 11:15 CDT
Th228 *	6.34e-02	6.5e-02	8.7e-02	PCI/L	03/12/2012 11:15 CDT
Th230 *	4.10e-02	5.1e-02	6.4e-02	PCI/L	03/12/2012 11:15 CDT
Th232 *	3.72e-03	3.4e-02	7.3e-02	PCI/L	03/12/2012 11:15 CDT

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01197G	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS85	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.49e-03	5.0e-02	1.3e-01	PCI/L	03/12/2012 11:15 CDT
Th228	9.77e-02	8.0e-02	9.7e-02	PCI/L	03/12/2012 11:15 CDT
Th230	2.73e-02	4.9e-02	7.7e-02	PCI/L	03/12/2012 11:15 CDT
Th232	3.51e-02	5.5e-02	8.4e-02	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01198H	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS86	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.69e-03	5.1e-02	1.3e-01	PCI/L	03/12/2012 11:15 CDT
Th228	3.21e-02	6.9e-02	1.2e-01	PCI/L	03/12/2012 11:15 CDT
Th230	9.21e-02	7.3e-02	6.9e-02	PCI/L	03/12/2012 11:15 CDT
Th232	-1.20e-02	2.9e-02	8.7e-02	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01199J	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS87	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	5.17e-02	9.1e-02	1.1e-01	PCI/L	03/12/2012 11:15 CDT
Th228	1.44e-01	1.0e-01	1.2e-01	PCI/L	03/12/2012 11:15 CDT
Th230	8.09e-02	7.2e-02	5.8e-02	PCI/L	03/12/2012 11:15 CDT
Th232	3.59e-02	5.5e-02	7.7e-02	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01200H	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS88	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	0.00e+00	1.0e-01	2.1e-01	PCI/L	03/12/2012 11:15 CDT
Th228	2.35e-01	2.1e-01	2.9e-01	PCI/L	03/12/2012 11:15 CDT
Th230	1.01e-01	1.3e-01	1.8e-01	PCI/L	03/12/2012 11:15 CDT
Th232	2.52e-02	7.3e-02	1.1e-01	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01201J	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS112	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	1.53e-02	6.8e-02	1.3e-01	PCI/L	03/12/2012 11:15 CDT
Th228	4.78e-02	6.7e-02	1.0e-01	PCI/L	03/12/2012 11:15 CDT
Th230	2.78e-02	5.0e-02	7.8e-02	PCI/L	03/12/2012 11:15 CDT
Th232	2.38e-02	4.2e-02	5.2e-02	PCI/L	03/12/2012 11:15 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01202K	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS122	GVJ

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	*	3.26e-02	7.0e-02	1.1e-01	PCI/L	03/12/2012 11:15 CDT
Th228	*	-3.06e-02	3.0e-02	1.0e-01	PCI/L	03/12/2012 11:15 CDT
Th230	*	8.16e-02	6.2e-02	4.4e-02	PCI/L	03/12/2012 11:15 CDT
Th232	*	6.79e-03	3.0e-02	5.8e-02	PCI/L	03/12/2012 11:15 CDT

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01203L	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS124	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-1.62e-02	5.6e-02	1.6e-01	PCI/L	03/12/2012 11:15 CDT
Th228	7.20e-02	8.0e-02	1.2e-01	PCI/L	03/12/2012 11:15 CDT
Th230	4.66e-02	5.8e-02	7.3e-02	PCI/L	03/12/2012 11:15 CDT
Th232	0.00e+00	2.7e-02	5.5e-02	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01204M	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015797C
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:01	1000.0	AS125	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-1.00e-02	6.6e-02	1.7e-01	PCI/L	03/12/2012 11:15 CDT
Th228	4.17e-02	7.4e-02	1.2e-01	PCI/L	03/12/2012 11:15 CDT
Th230	6.25e-02	7.1e-02	6.8e-02	PCI/L	03/12/2012 11:15 CDT
Th232	6.24e-02	7.1e-02	6.7e-02	PCI/L	03/12/2012 11:15 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01205N	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS99	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.69e-03	5.1e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th228	7.89e-02	7.2e-02	8.2e-02	PCI/L	03/13/2012 10:50 CDT
Th230	2.49e-02	4.4e-02	5.4e-02	PCI/L	03/13/2012 10:50 CDT
Th232	-4.15e-03	2.8e-02	7.1e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01206P	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS100	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	0.00e+00	4.9e-02	1.0e-01	PCI/L	03/13/2012 10:50 CDT
Th228	1.26e-01	9.4e-02	1.1e-01	PCI/L	03/13/2012 10:50 CDT
Th230	2.53e-02	4.5e-02	5.5e-02	PCI/L	03/13/2012 10:50 CDT
Th232	0.00e+00	3.9e-02	9.1e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01207Q	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS101	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.61e-03	5.0e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th228	1.15e-01	8.8e-02	1.0e-01	PCI/L	03/13/2012 10:50 CDT
Th230	7.40e-02	6.6e-02	5.3e-02	PCI/L	03/13/2012 10:50 CDT
Th232	1.64e-02	4.5e-02	8.1e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01208R	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS102	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	2.36e-02	6.9e-02	1.0e-01	PCI/L	03/13/2012 10:50 CDT
Th228	3.40e-02	6.0e-02	9.9e-02	PCI/L	03/13/2012 10:50 CDT
Th230	4.25e-02	5.9e-02	8.4e-02	PCI/L	03/13/2012 10:50 CDT
Th232	1.27e-02	4.7e-02	9.2e-02	PCI/L	03/13/2012 10:50 CDT

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01209T	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS103	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-7.82e-03	5.2e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th228	9.72e-02	7.7e-02	7.3e-02	PCI/L	03/13/2012 10:50 CDT
Th230	5.49e-02	6.4e-02	8.3e-02	PCI/L	03/13/2012 10:50 CDT
Th232	8.44e-03	3.8e-02	7.2e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01210K	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS104	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	0.00e+00	4.7e-02	9.7e-02	PCI/L	03/13/2012 10:50 CDT
Th228	1.25e-01	9.8e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th230	1.61e-02	4.4e-02	7.9e-02	PCI/L	03/13/2012 10:50 CDT
Th232	0.00e+00	2.5e-02	5.2e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01211L	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS105	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	1.43e-02	6.4e-02	1.2e-01	PCI/L	03/13/2012 10:50 CDT
Th228	1.01e-01	8.3e-02	1.1e-01	PCI/L	03/13/2012 10:50 CDT
Th230	3.09e-02	4.8e-02	6.6e-02	PCI/L	03/13/2012 10:50 CDT
Th232	7.72e-03	3.5e-02	6.6e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01212M	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS107	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	0.00e+00	4.8e-02	9.8e-02	PCI/L	03/13/2012 10:50 CDT
Th228	6.98e-02	7.2e-02	9.6e-02	PCI/L	03/13/2012 10:50 CDT
Th230	1.23e-02	3.6e-02	5.3e-02	PCI/L	03/13/2012 10:50 CDT
Th232	-4.10e-03	2.7e-02	7.0e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01213N	QC batch #:	0008533B
Matrix:	WATER-DRINKING	Assay batch #:	0015806K
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS108	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	1.52e-02	6.8e-02	1.3e-01	PCI/L	03/13/2012 10:50 CDT
Th228	1.23e-02	6.1e-02	1.2e-01	PCI/L	03/13/2012 10:50 CDT
Th230	-1.23e-02	3.0e-02	8.9e-02	PCI/L	03/13/2012 10:50 CDT
Th232	8.18e-03	3.7e-02	7.0e-02	PCI/L	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00632962J	QC batch #:	0008533B
Matrix:	N/A	Assay batch #:	0015806K
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS110	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-1.83e-03	1.2e-02	3.1e-02	PCI	03/13/2012 10:50 CDT
Th228	1.98e-02	1.7e-02	1.7e-02	PCI	03/13/2012 10:50 CDT
Th230	2.84e+00	2.2e-01	1.9e-02	PCI	03/13/2012 10:50 CDT
Th232	3.95e-03	1.1e-02	1.9e-02	PCI	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00632961H	QC batch #:	0008533B
Matrix:	N/A	Assay batch #:	0015806K
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	AS
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/14/2012 16:07	1000.0	AS111	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	0.00e+00	1.2e-02	2.4e-02	PCI	03/13/2012 10:50 CDT
Th228	9.95e-03	1.7e-02	2.8e-02	PCI	03/13/2012 10:50 CDT
Th230	8.96e-03	1.4e-02	2.2e-02	PCI	03/13/2012 10:50 CDT
Th232	1.99e-03	8.9e-03	1.7e-02	PCI	03/13/2012 10:50 CDT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100243

QC BATCH SUMMARY

QC batch #: 0008533B
Preparation procedure: N/A
Analysis procedure: NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01194D	DUP	90.21 %	2.41 %	AS
B2.01195E		101.78 %	2.74 %	AS
B2.01196F		99.70 %	2.72 %	AS
B2.01197G		103.11 %	2.78 %	AS
B2.01197G		100.62 %	2.72 %	AS
B2.01198H		99.08 %	2.71 %	AS
B2.01199J		85.45 %	2.38 %	AS
B2.01200H		44.81 %	1.46 %	AS
B2.01201J		95.35 %	2.59 %	AS
B2.01202K		108.24 %	2.89 %	AS
B2.01203L		90.80 %	2.50 %	AS
B2.01204M		72.72 %	2.09 %	AS
B2.01205N		91.19 %	2.43 %	AS
B2.01206P		90.75 %	2.42 %	AS
B2.01207Q		93.10 %	2.48 %	AS
B2.01208R		91.55 %	2.44 %	AS
B2.01209T		90.15 %	2.40 %	AS
B2.01210K		93.39 %	2.49 %	AS
B2.01211L		95.02 %	2.52 %	AS
B2.01212M		90.74 %	2.42 %	AS
B2.01213N		92.08 %	2.46 %	AS
LCS-00632962J *	LCS	98.77 %	2.60 %	AS
RBK-00632961H *	RBK	96.12 %	2.54 %	AS

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory QC Batch Report

QC Batch #: 0008533B

Analytical Method: NAREL TH-EICHROM

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00632961H	TH227	0.00e+00 \pm 1.2e-02	2012-03-13	OK
00632961H	TH228	9.95e-03 \pm 1.7e-02	2012-03-13	OK
00632961H	TH230	8.96e-03 \pm 1.4e-02	2012-03-13	OK
00632961H	TH232	1.99e-03 \pm 8.9e-03	2012-03-13	OK

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01197G	TH227	0.00e+00 \pm 4.5e-02	-7.49e-03 \pm 5.0e-02	0.00	-0.22 OK
B2.01197G	TH228	6.34e-02 \pm 6.5e-02	9.77e-02 \pm 8.0e-02	42.60	0.66 OK
B2.01197G	TH230	4.10e-02 \pm 5.1e-02	2.73e-02 \pm 4.9e-02	39.96	-0.39 OK
B2.01197G	TH232	3.72e-03 \pm 3.4e-02	3.51e-02 \pm 5.5e-02	161.66	0.97 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00632962J	TH227	NO SPIKE DATA			
00632962J	TH228	NO SPIKE DATA			
00632962J	TH230	2.54e+00 \pm 2.2%	2.84e+00 \pm 2.2e-01	112.07	2.72 OK
00632962J	TH232	NO SPIKE DATA			

Analyst:

Albert Smith

3/22/2012

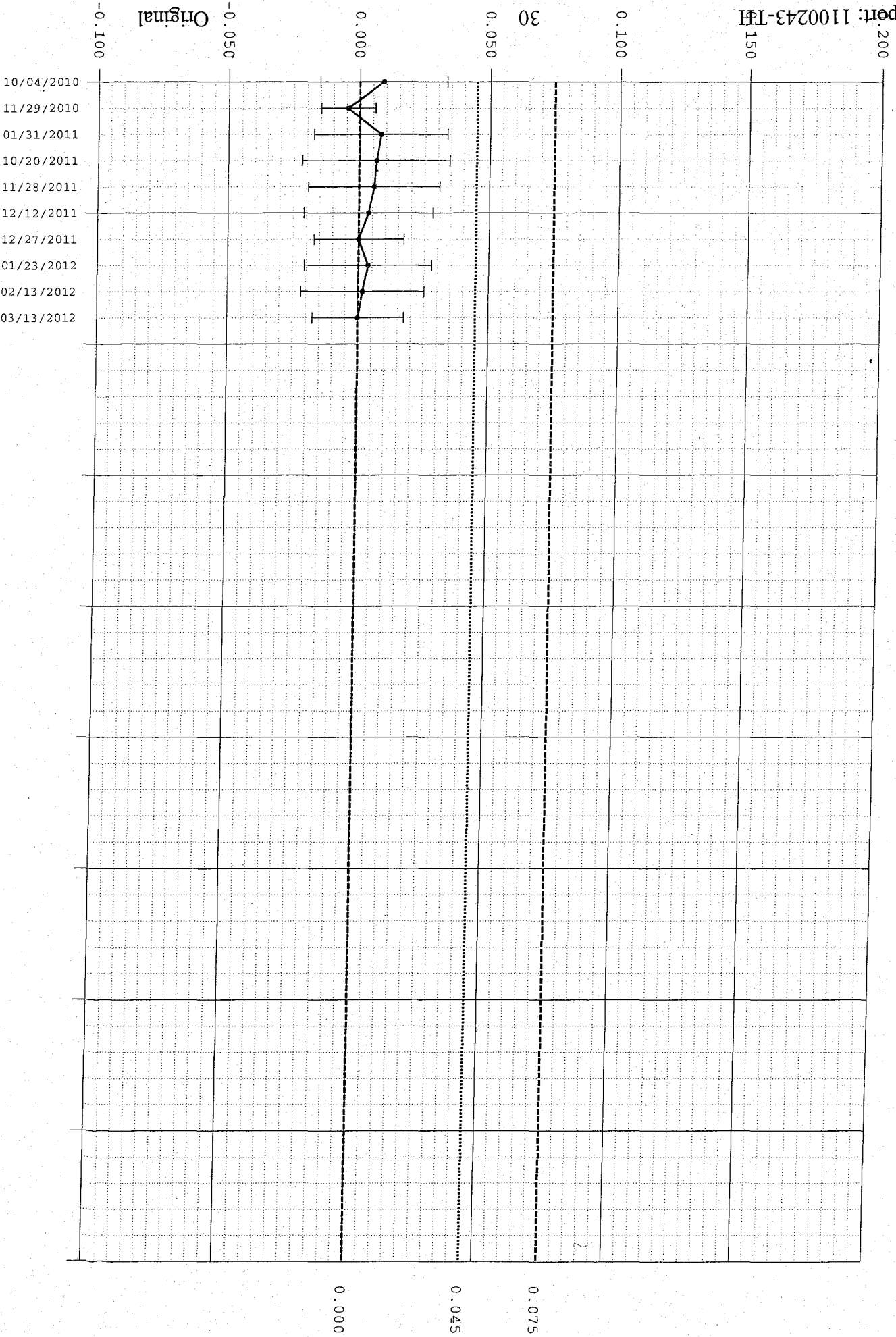
QA Officer:

Karl J. McLean

3/22/12

Method Blanks
Analyte: TH227
Method: NAREL TH-EICHRON
Analyst: Smith, Albert

Report: 1100243-TH



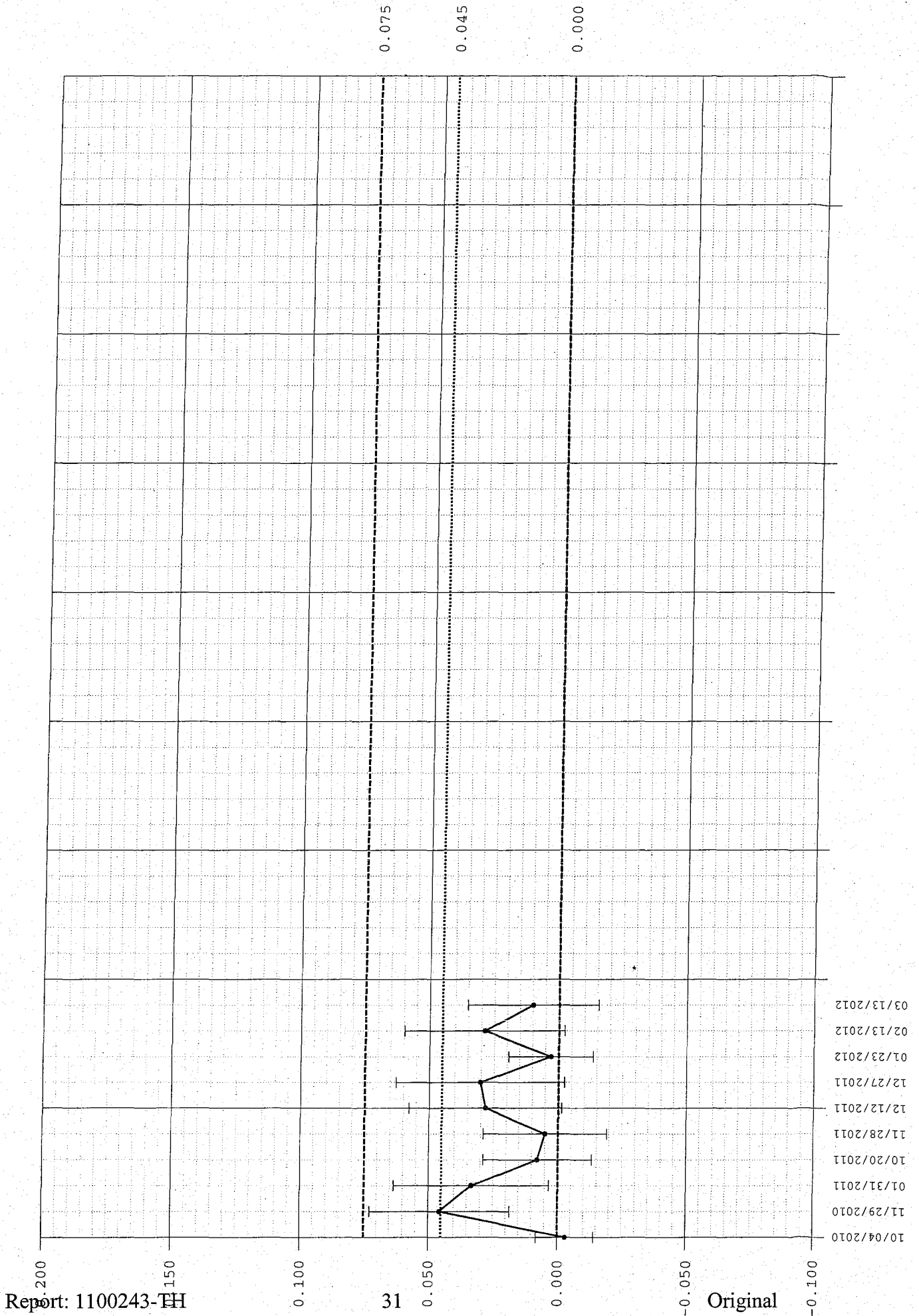
Method Blanks

Analyte: TH228

Method: NAREL TH-EICHROM

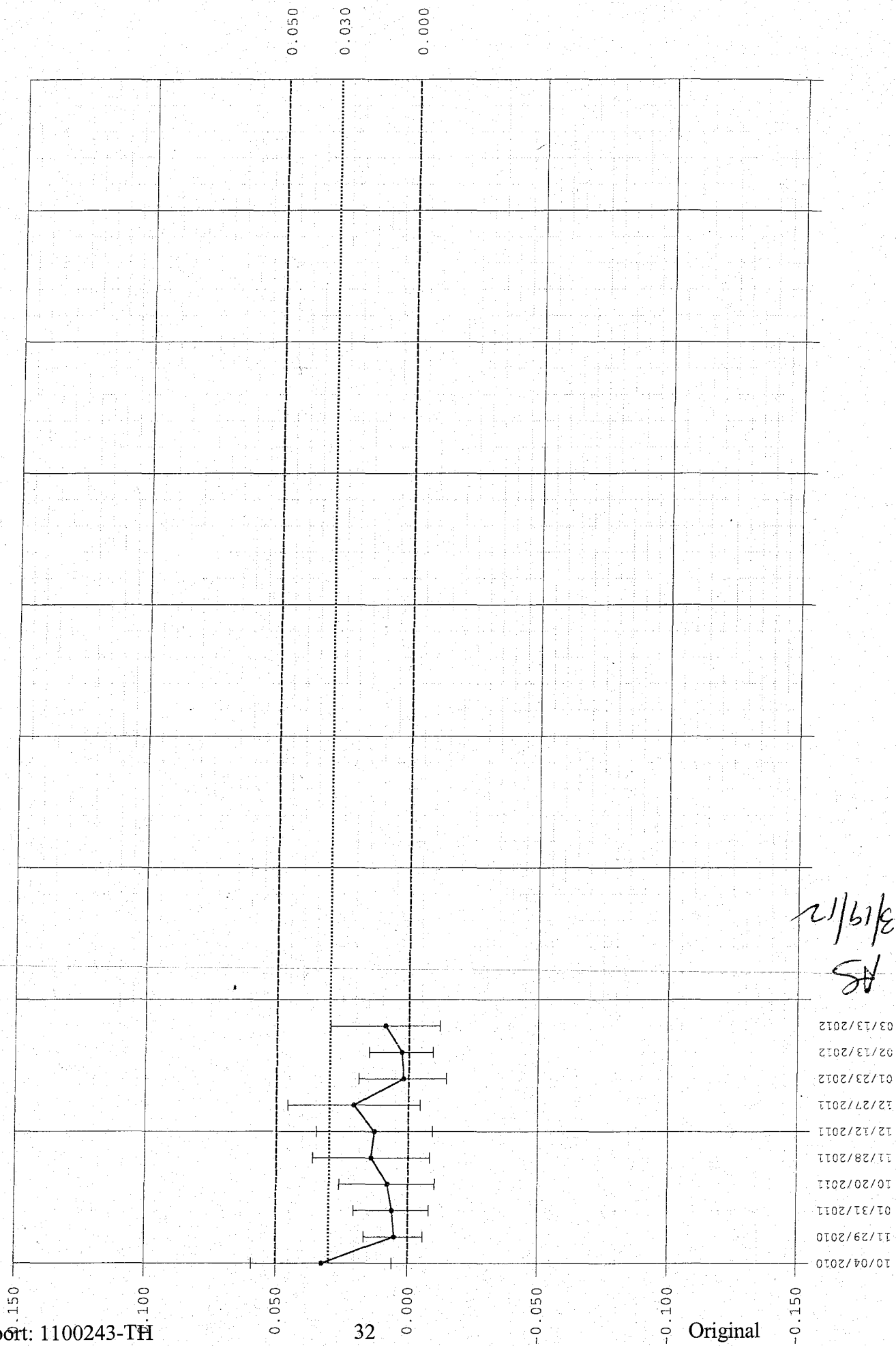
Analyst: Smith, Albert

Report: 1100243-TH



Method Blanks
Analyte: TH230
Method: NAREL TH-EICHRON
Analyst: Smith, Albert

Report: 1100243-TH



Method Blanks
Analyte: TH232
Method: NAREL TH-EICHRON
Analyst: Smith, Albert

Report: 1100243-TH

